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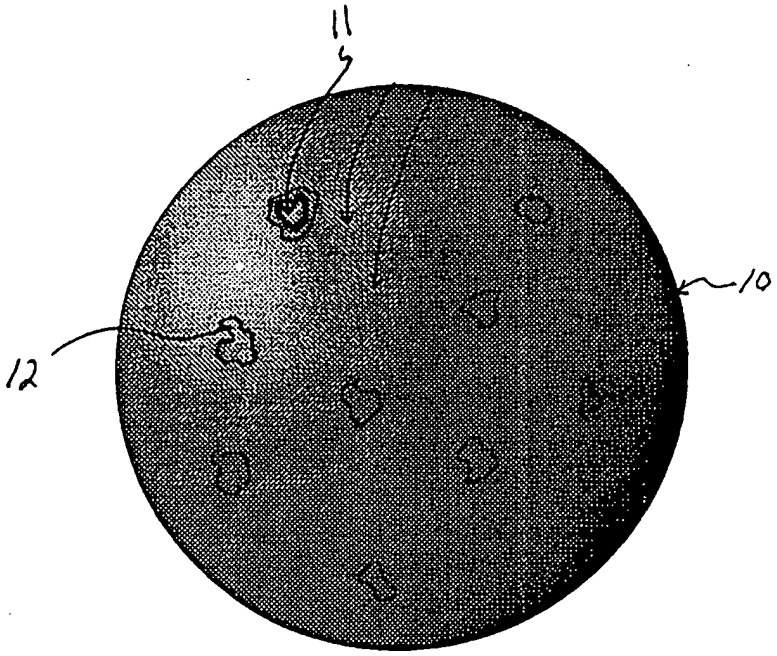


Fig. 1

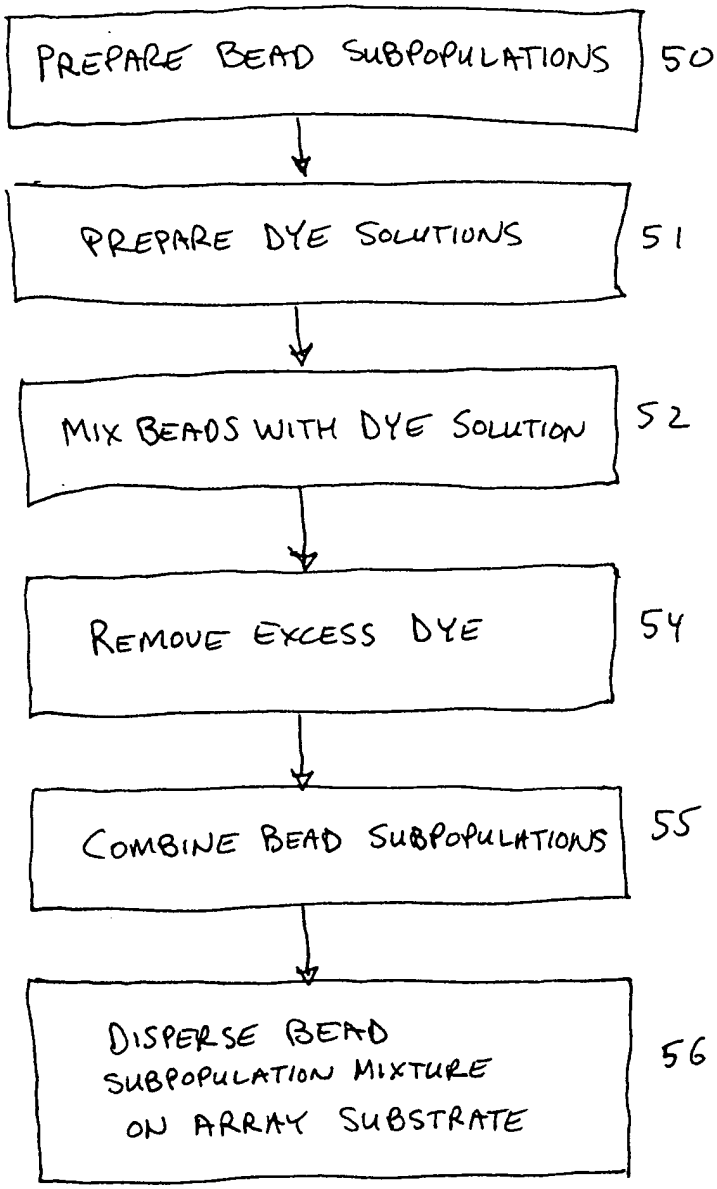
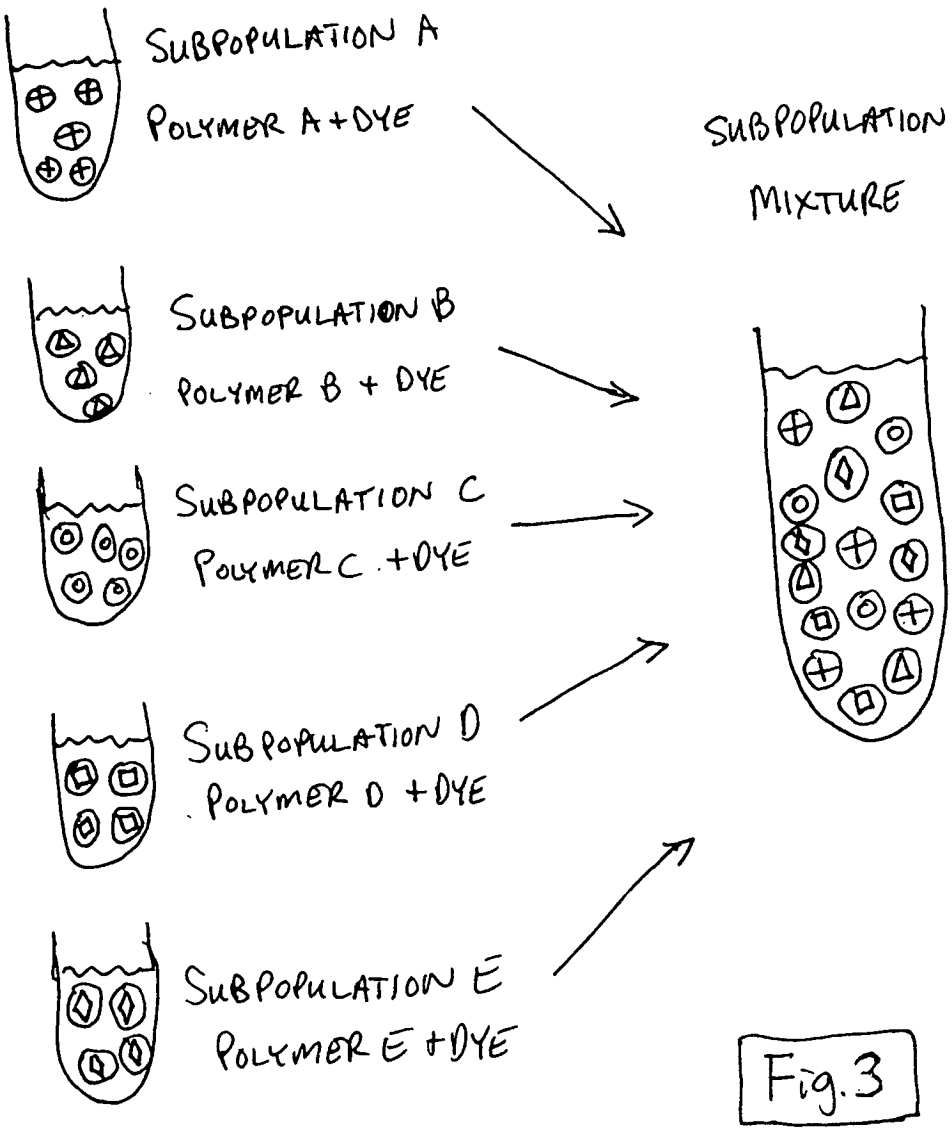

PREPARE BEAD SUBPOPULATIONS
50
PREPARE DYE SOLUTIONS
51
MIX BEADS WITH DYE SOLUTION
52
REMOVE EXCESS DYE
54
COMBINE BEAD SUBPOPULATIONS
55
DISPERSE BEAD SUBPOPULATION MIXTURE ON ARRAY SUBSTRATE
56

Fig. 2

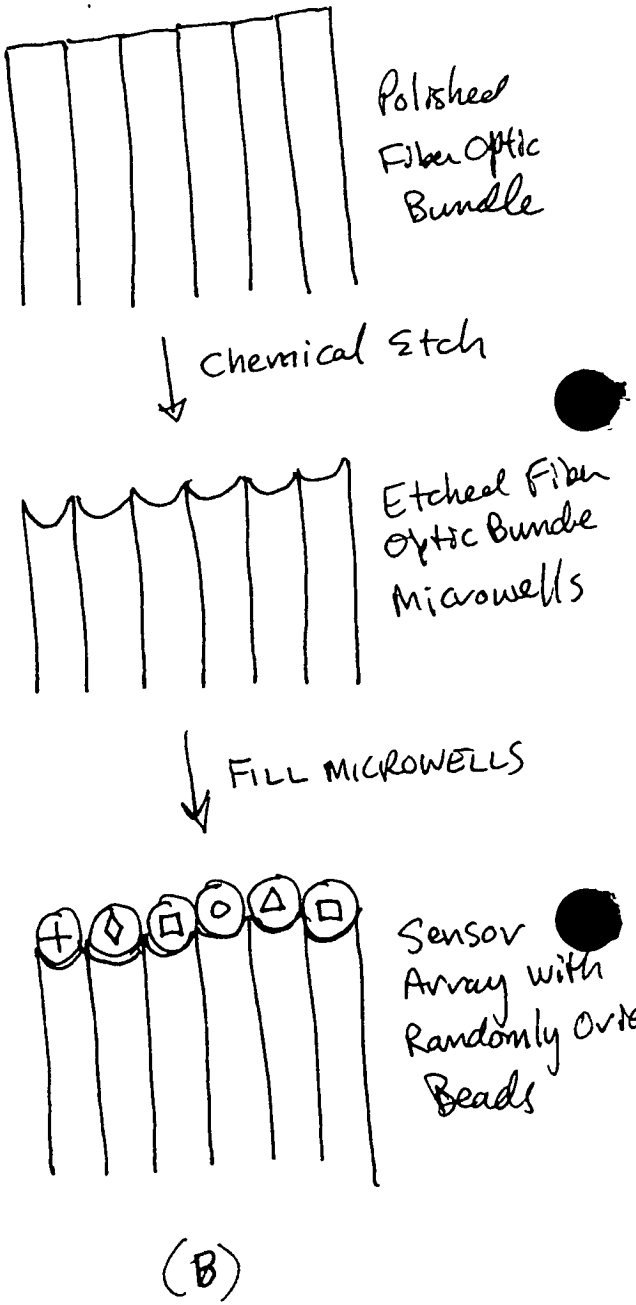
BEAD SUBPOPULATION PREPARATION



(A)

Fig. 3

FIBER OPTIC ARRAY PREPARATION



(B)

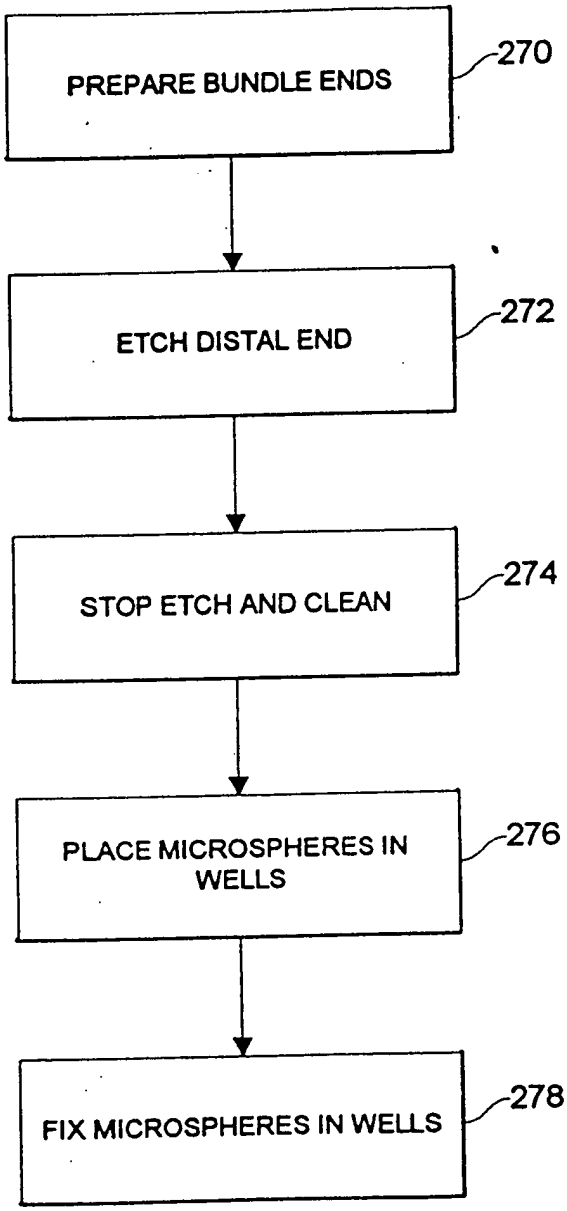

PREPARE BUNDLE ENDS
270
ETCH DISTAL END
272
STOP ETCH AND CLEAN
274
PLACE MICROSPHERES IN WELLS
276
FIX MICROSPHERES IN WELLS
278

Fig. 4

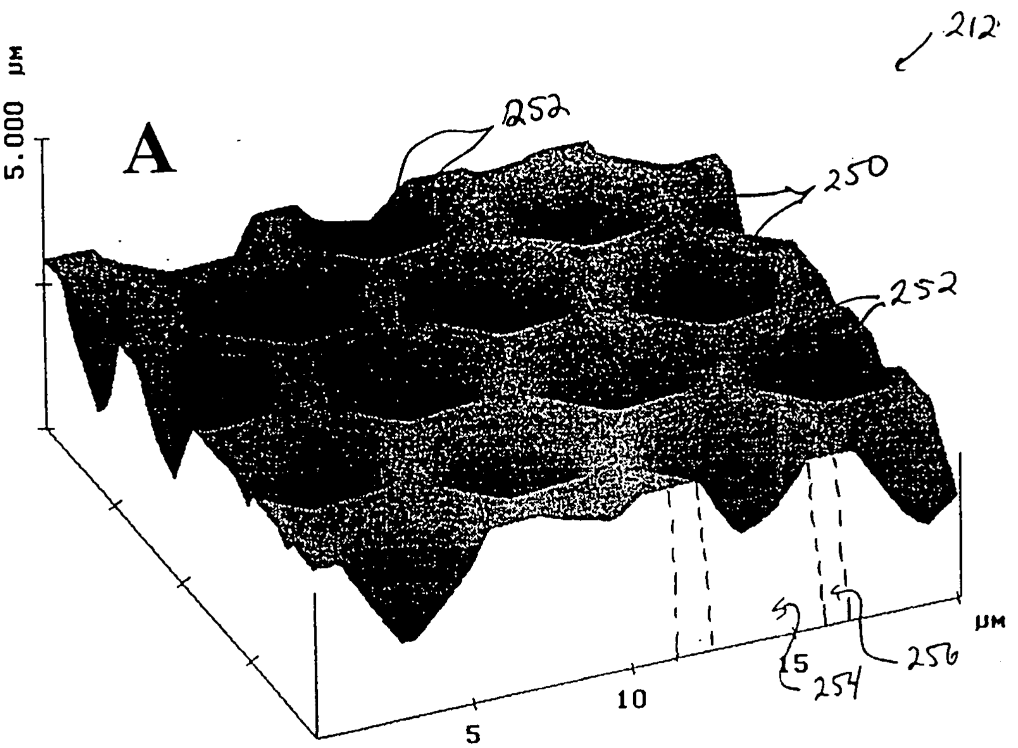

212
5.000 µM
A
252
250
252
µM
5
10
15
254
256

Fig. 5A

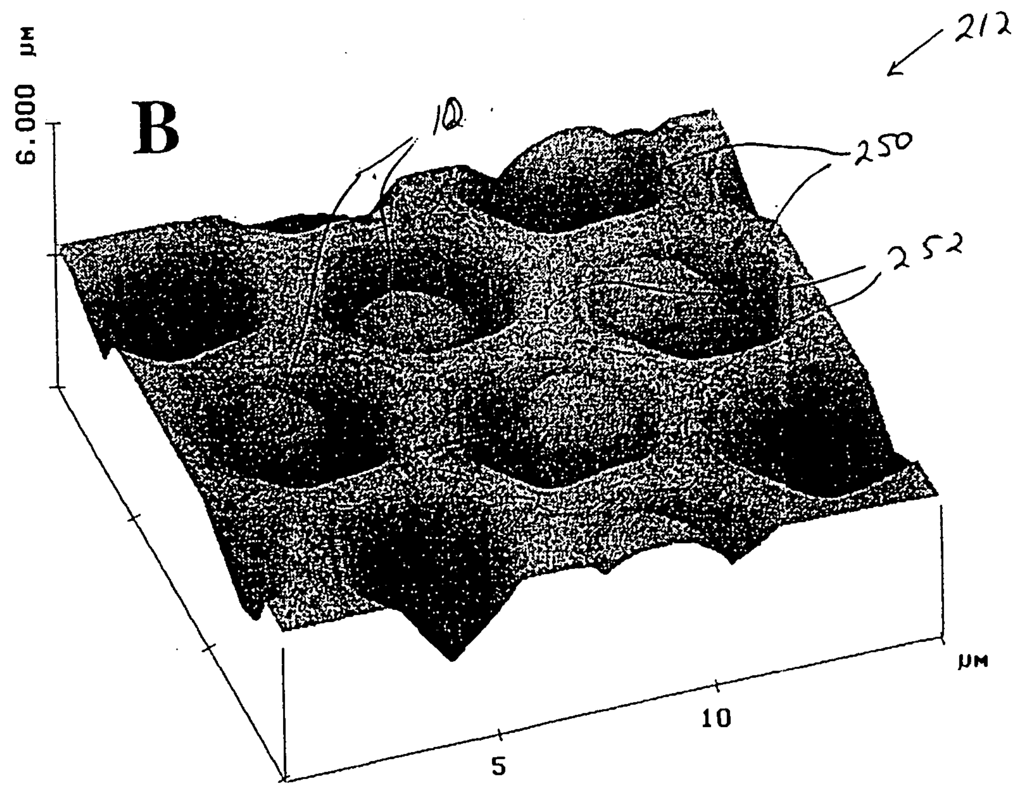
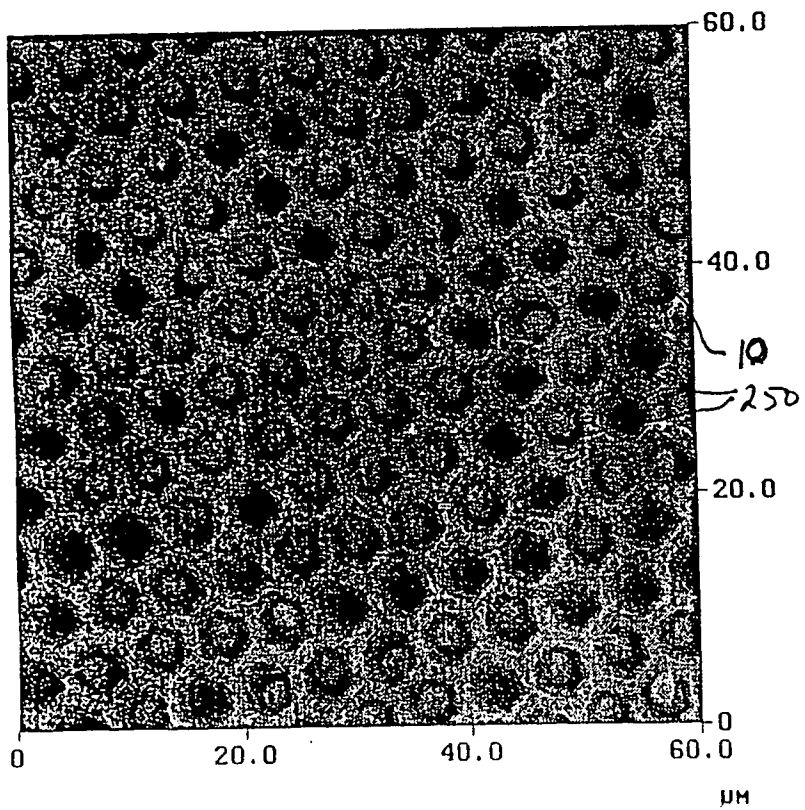

212
6.000 µM
B
10
250
252
µM
5
10

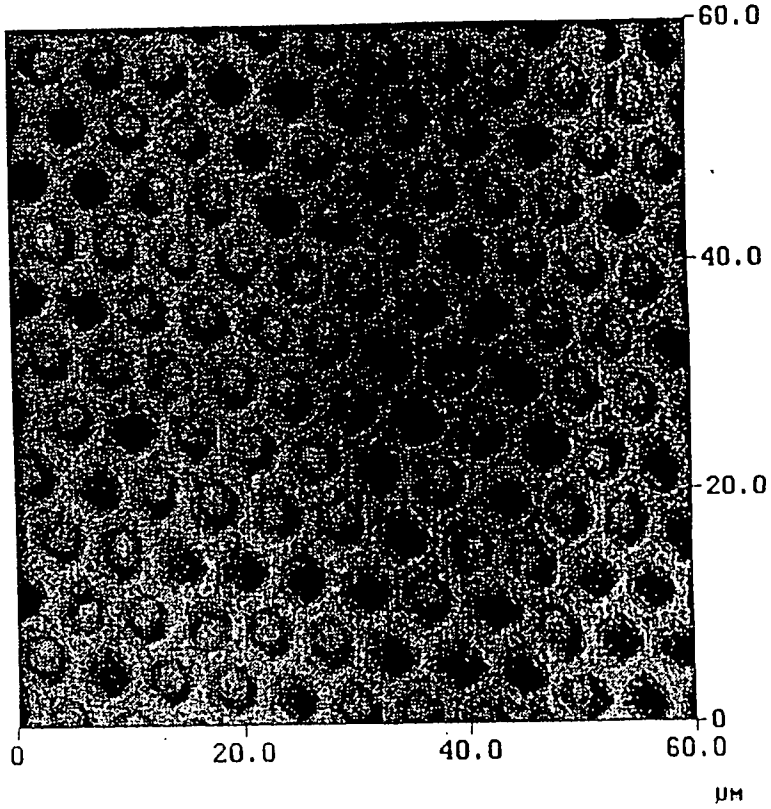
Fig 5B

Polymer Coated Beads in Wells After Air Pulse and Tapping



Before Tapping

Fig. 6A



After Tapping

Fig. 6B

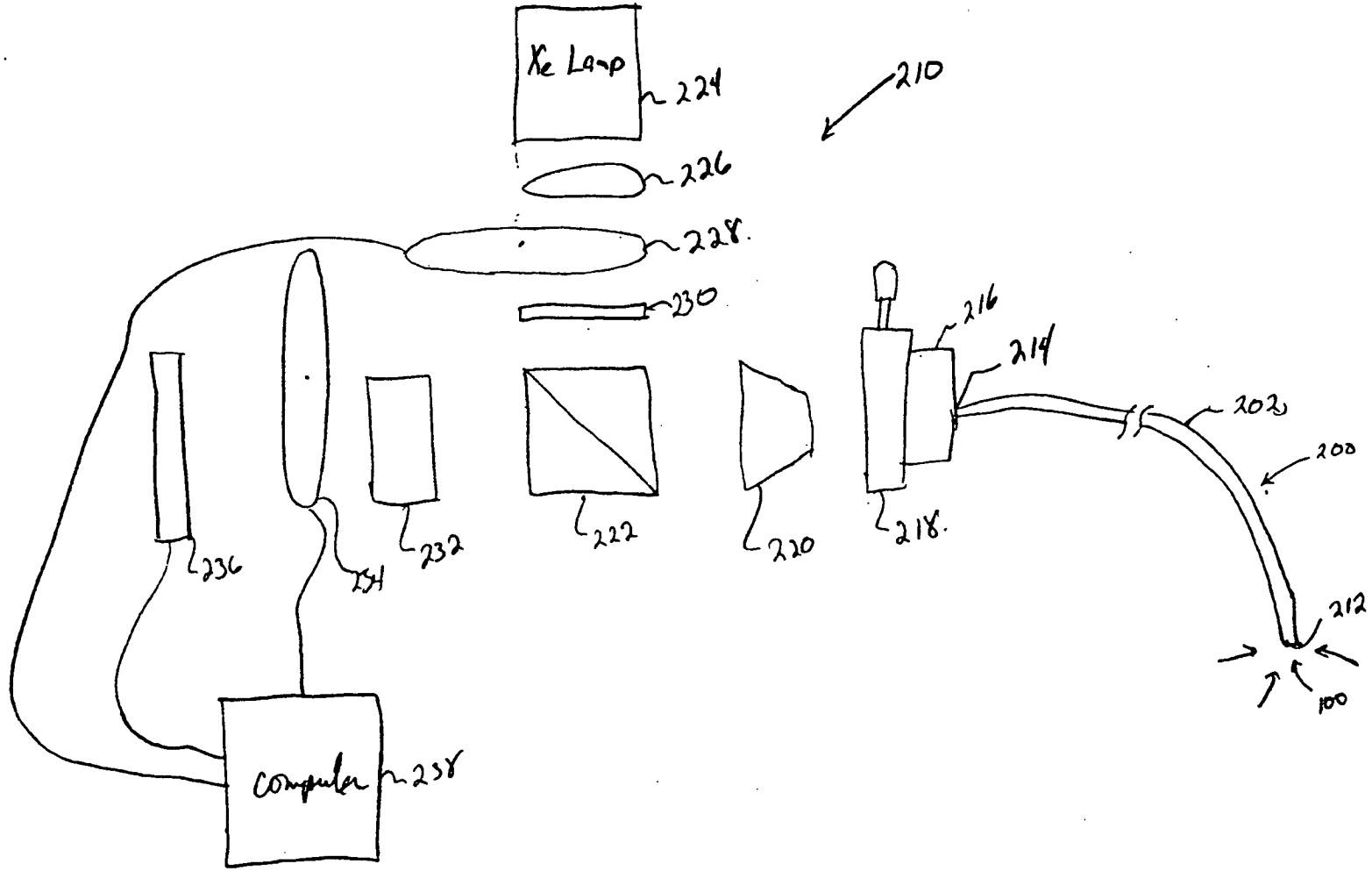

Xe Lamp
224
210
226
228
230
216
214
202
200
236
234
232
222
220
218
212
100
computer
238

Fig. 7

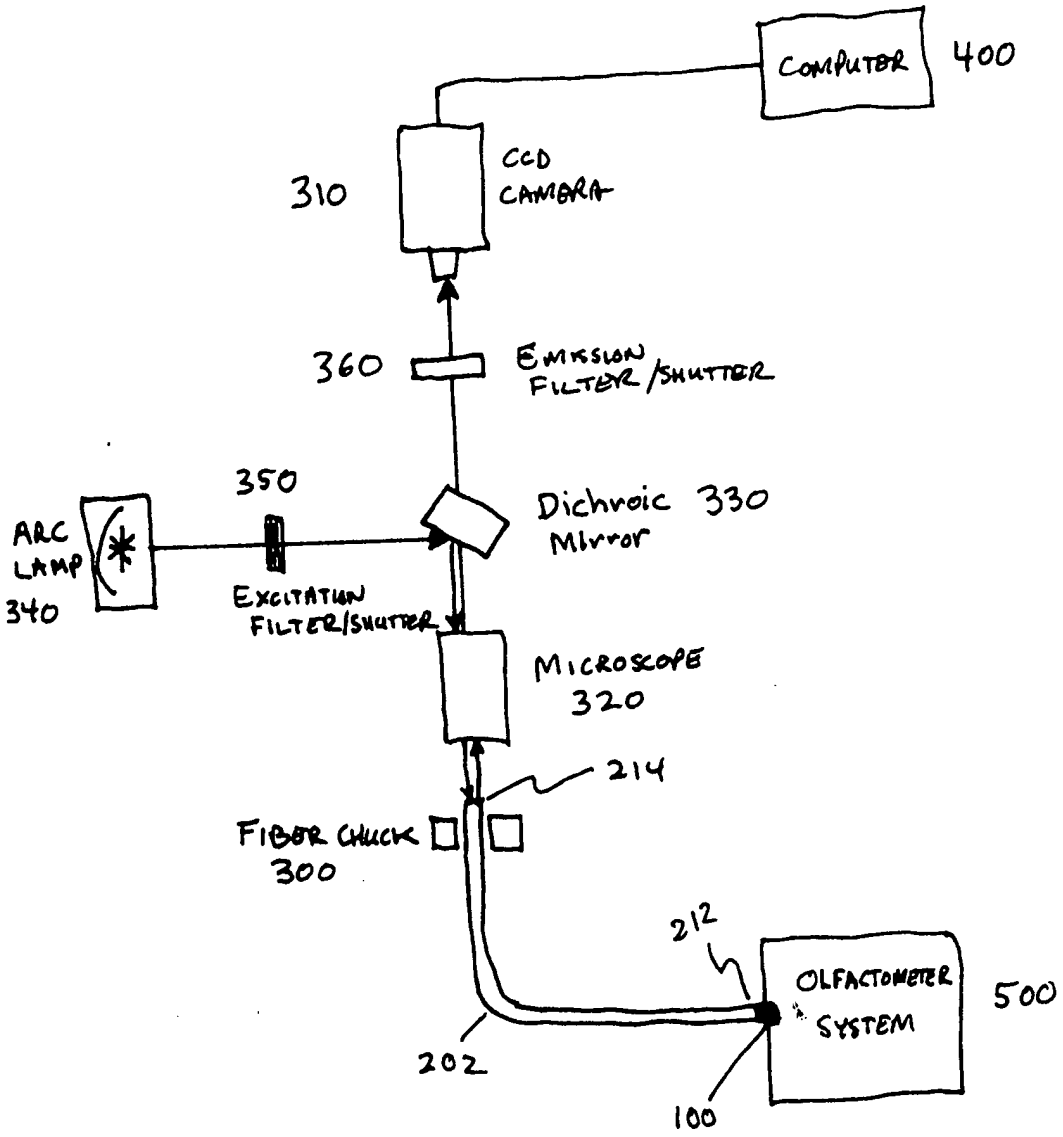

COMPUTER
400
CCD CAMERA
310
360
EMISSION FILTER/SHUTTER
350
ARC LAMP
340
EXCITATION FILTER/SHUTTER
Dichroic Mirror
330
MICROSCOPE
320
214
FIBER CHUCK
300
212
OLFACTOMETER SYSTEM
500
202
100

Fig 8

Fig. 9

Porous 3µm silica beads high-speed response to Saturated Toluene

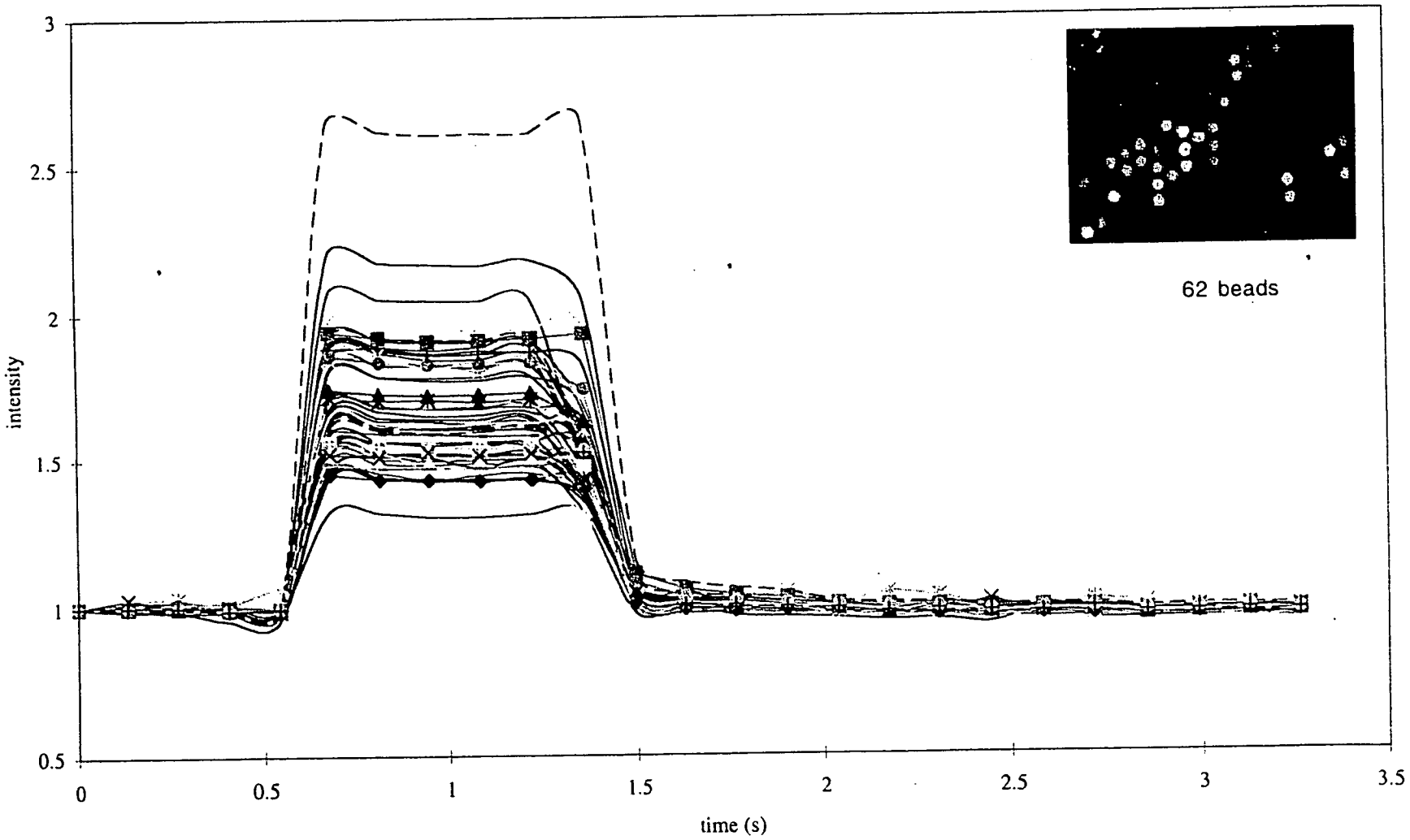


Fig. 10

PMS Beads in Fiber: Response to Methanol (sat)

39 beads, mid-fiber region: centroid ovals, standardized responses

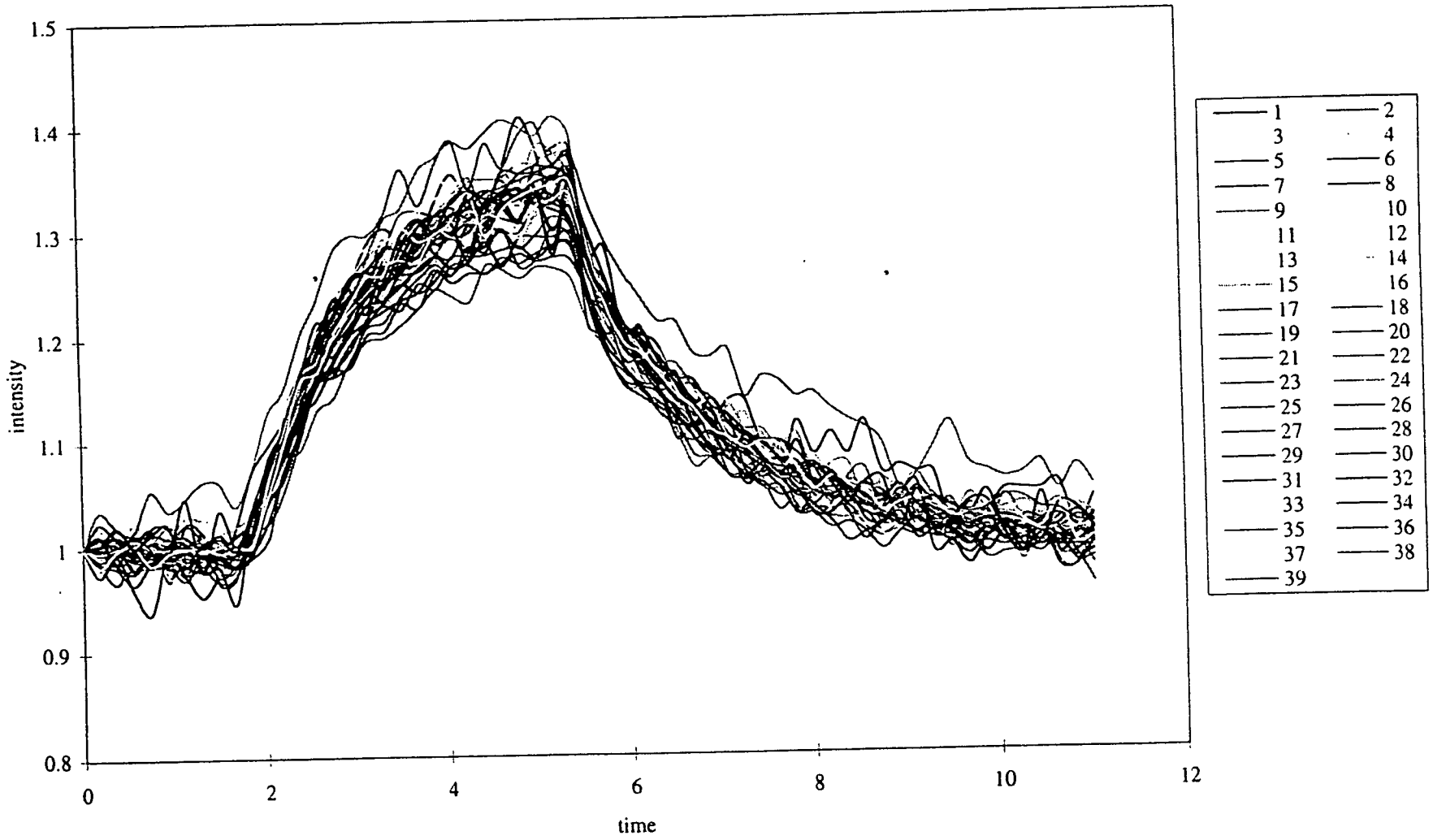
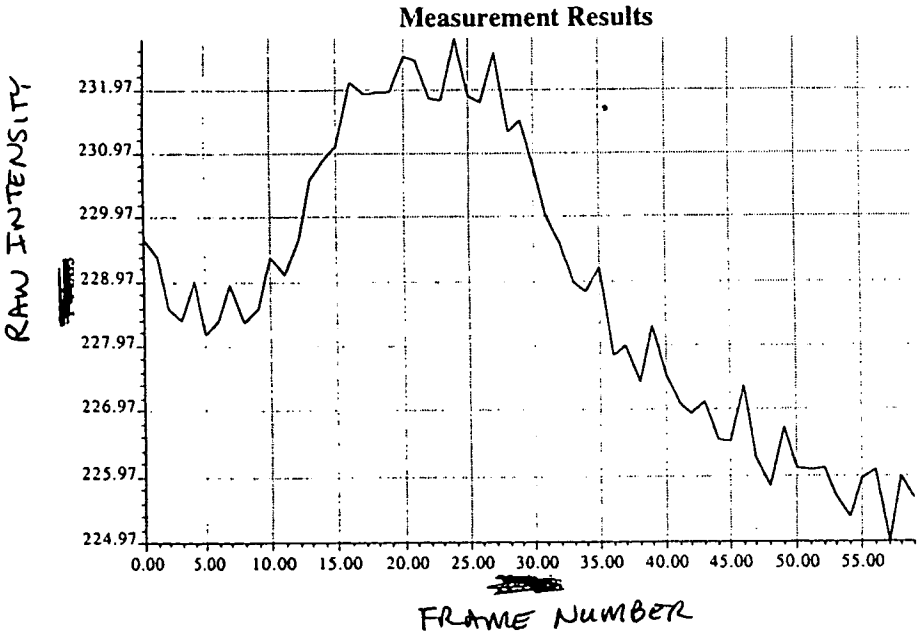


Fig. 11A/11B

PS802 648.c Beads

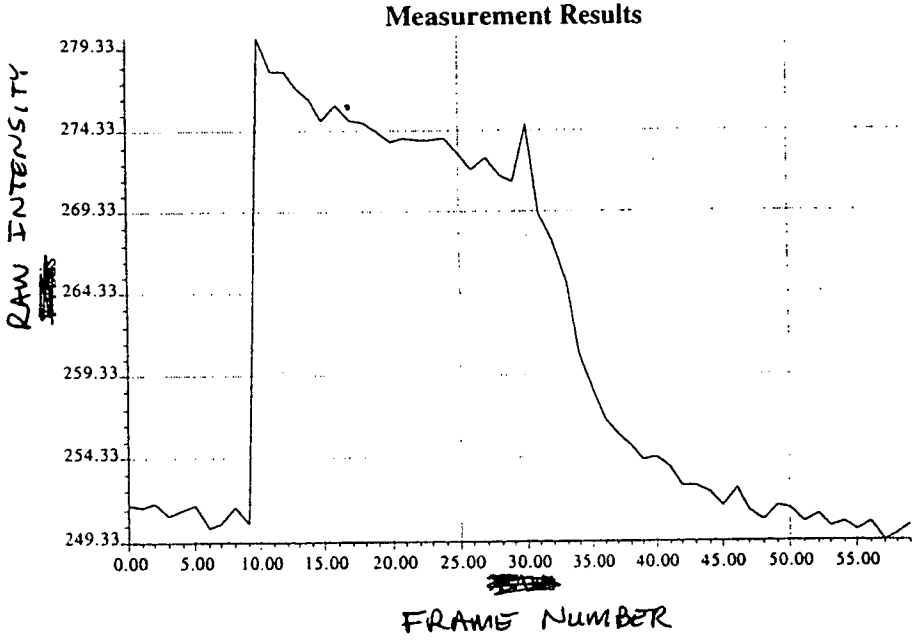
bead 1

Saturated Toluene



(A)

Saturated Methanol

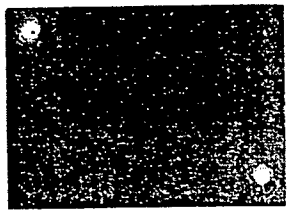


(B)

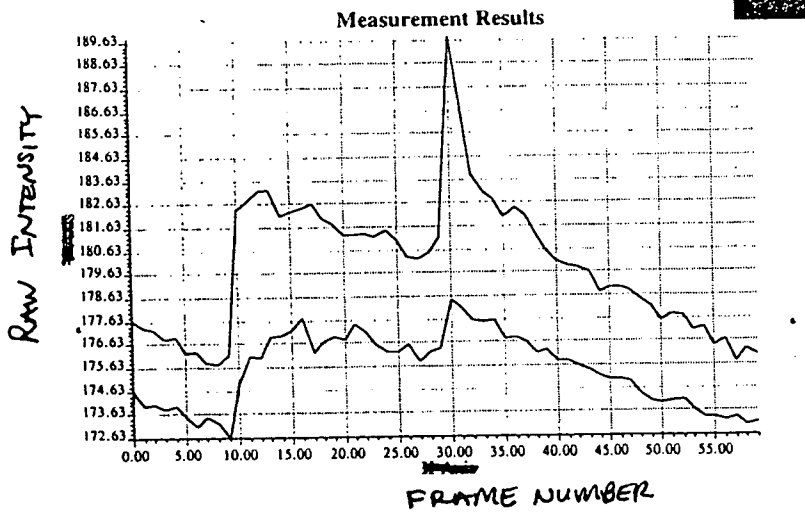
Fig. 12A/12B

PDPO/psil 9/11

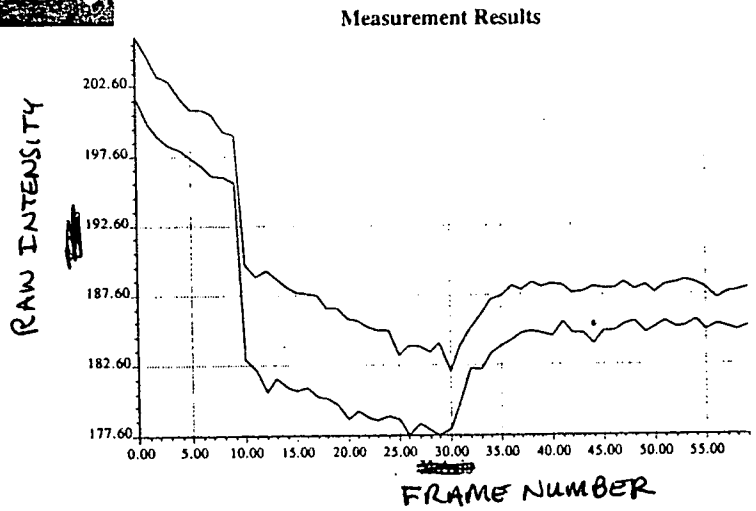
tol



met



(A)



(B)

Fig. 13

Porous 3µm silica beads response to Ethyl Acetate

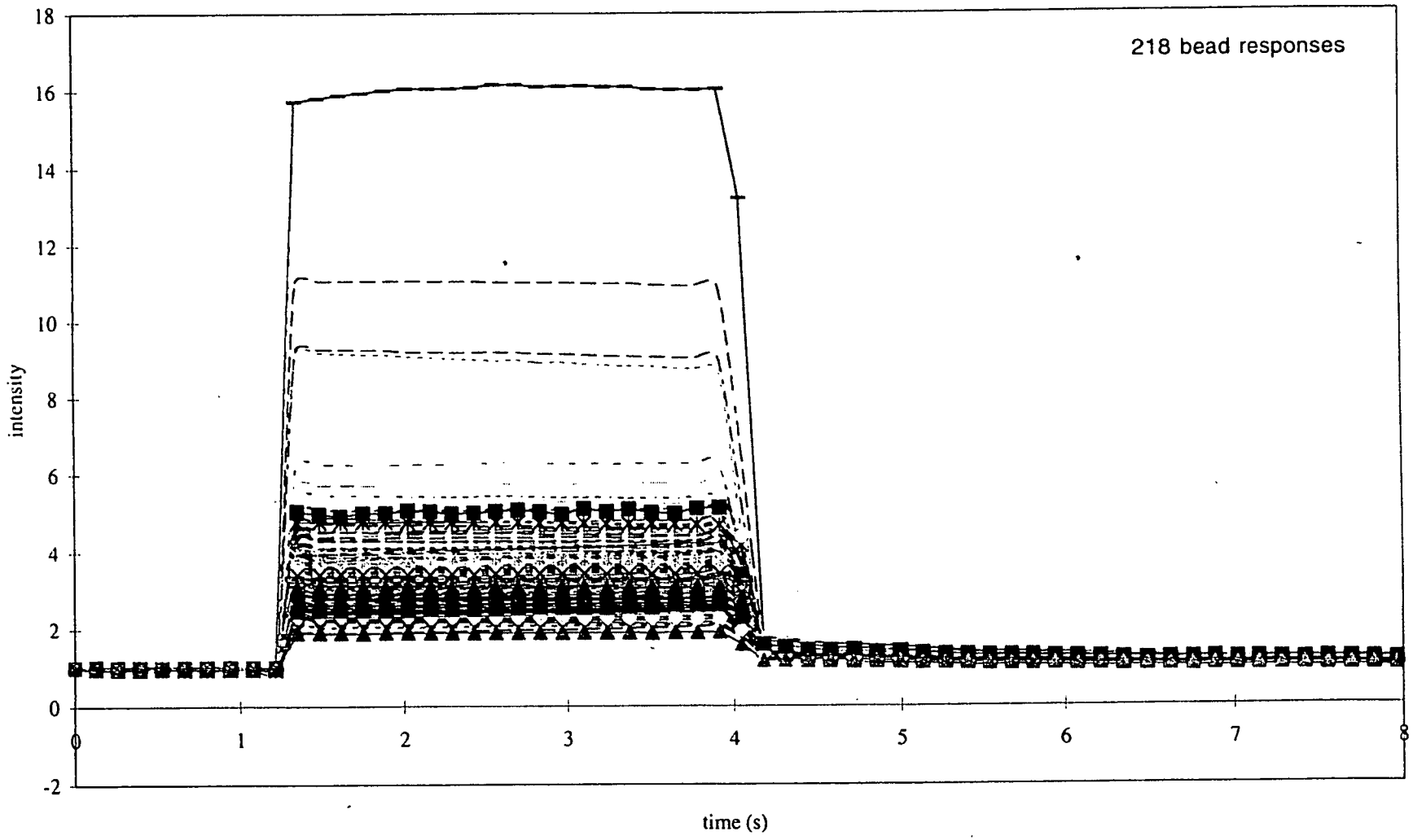
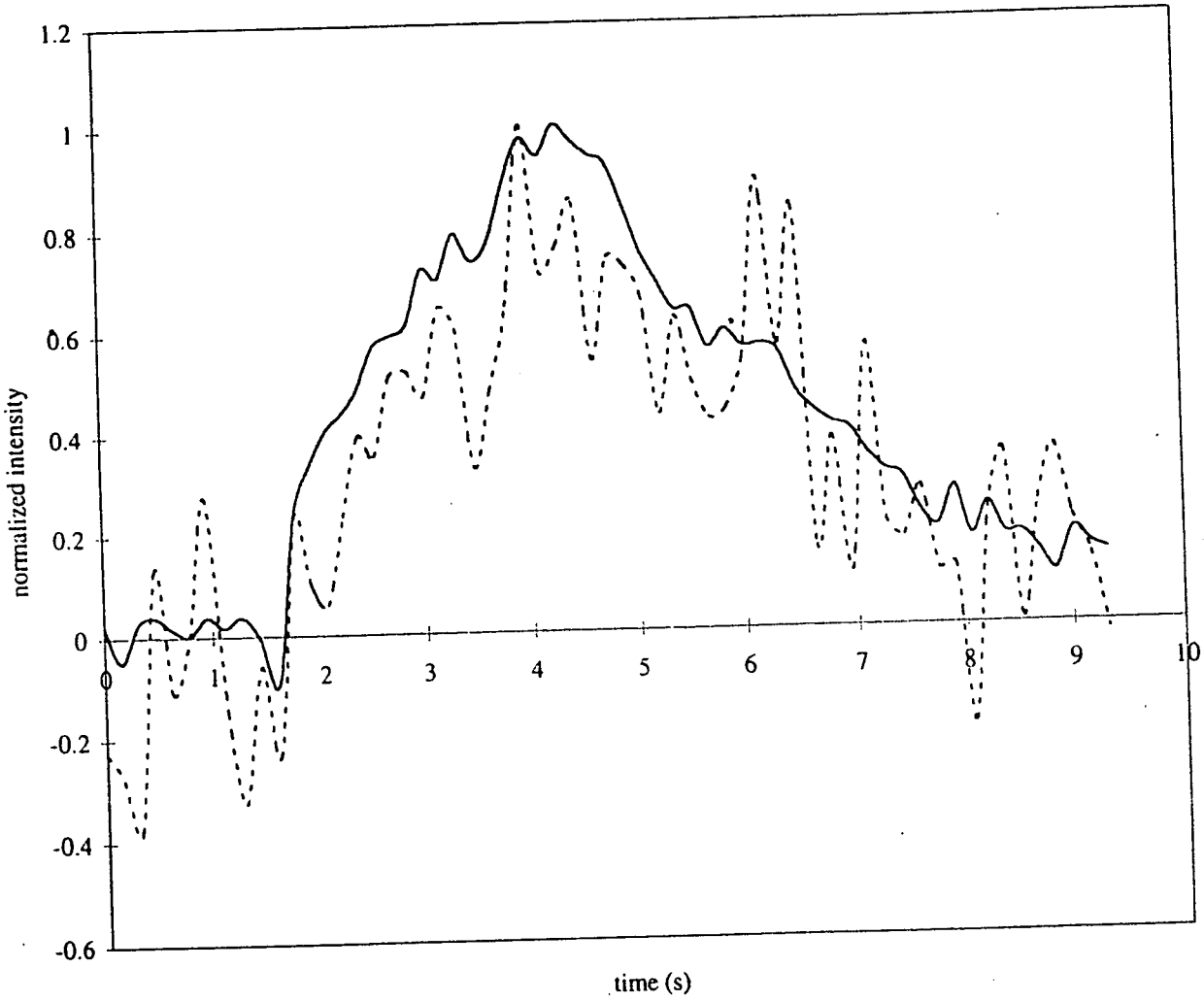


Fig. 14

Normalized signal-to-noise comparison between bead #1 and summed responses of 39 beads



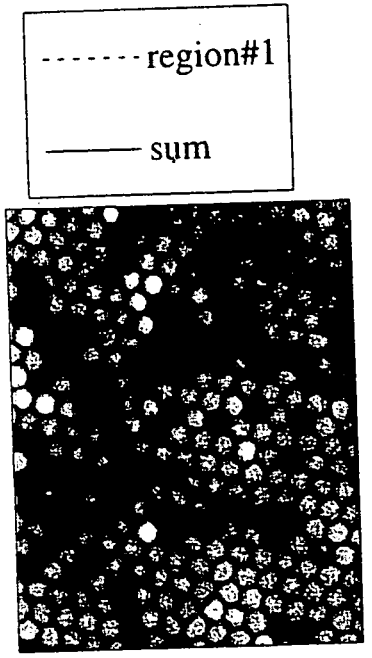
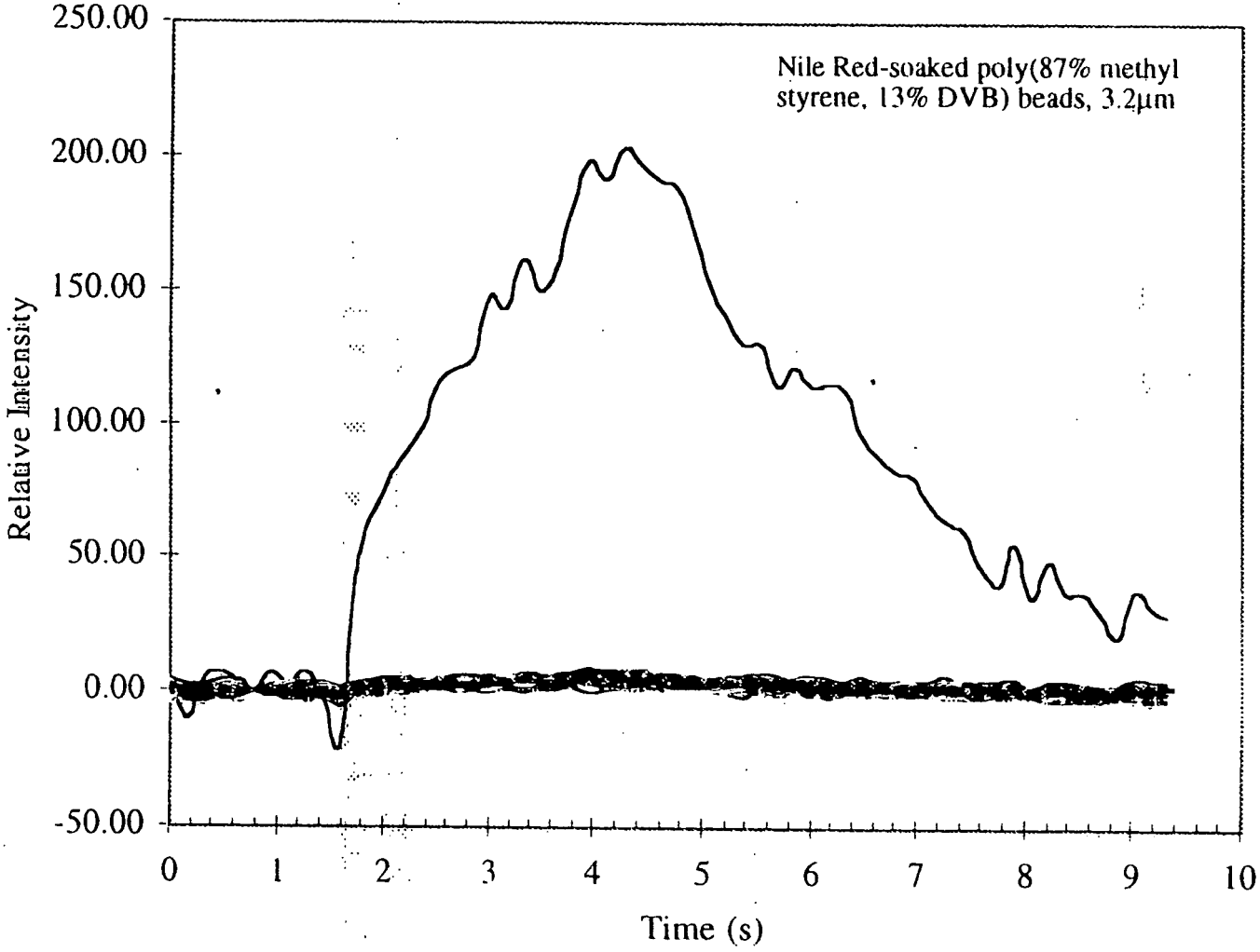
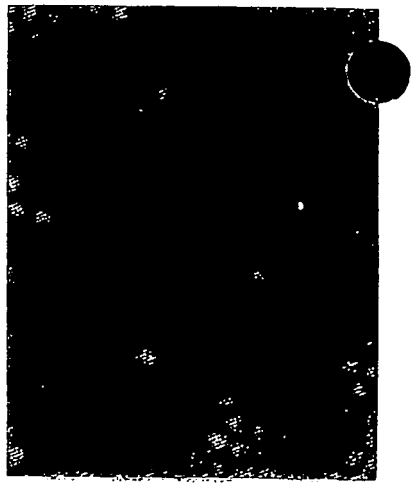


Fig. 15

Signal Enhancement Through Multi-bead Response Summing



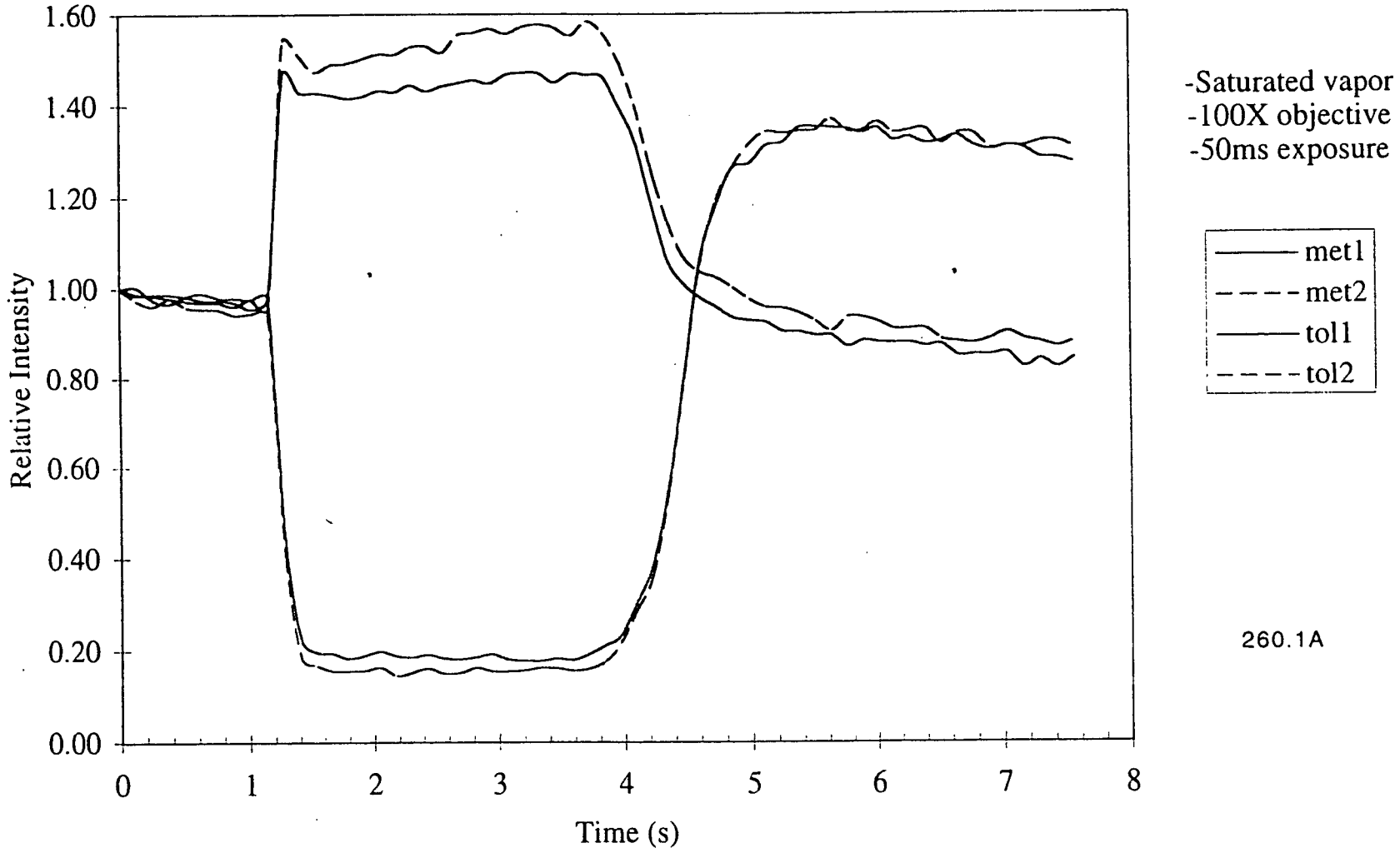


bright = wells with beads
dark = empty wells

Fig. 16

"Thick-layer" PS802/Silica 3.2μm Beads

Region 2



Self-Encoding Array with Two Bead Types in Image Guide Wells

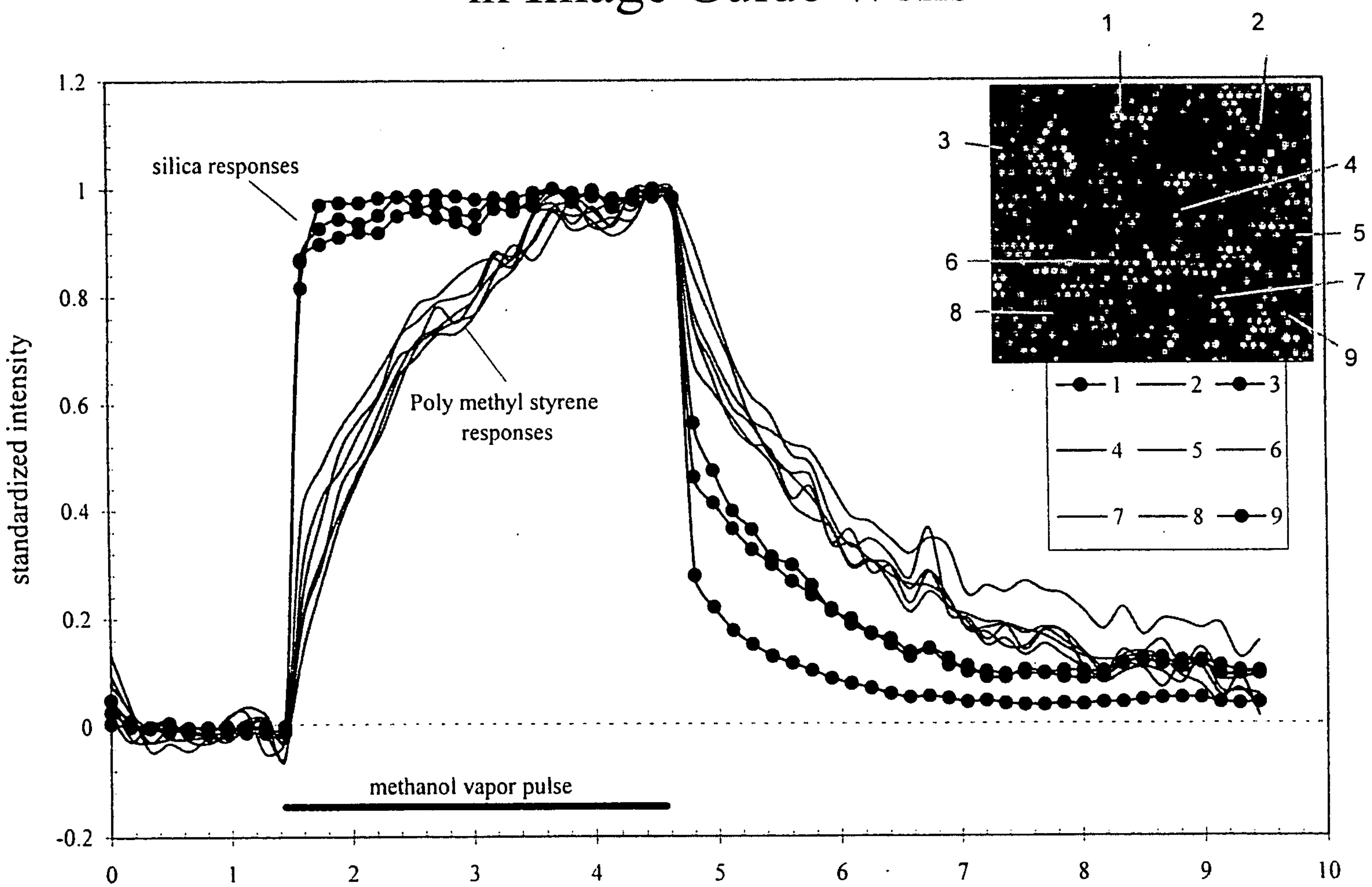


Fig. 17

Self-Encoding Array with Two Bead Types in Image Guide Wells

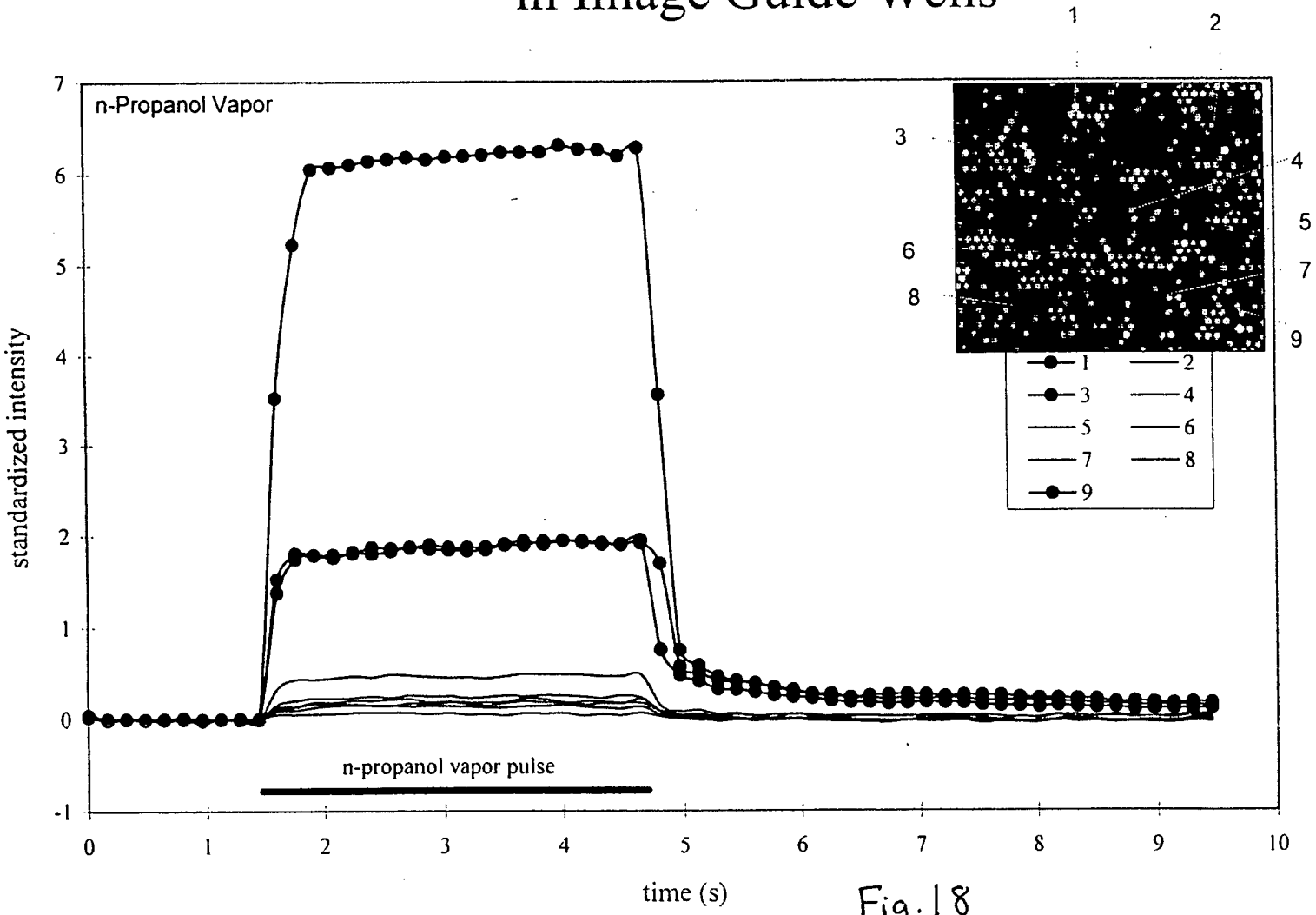


Fig. 18

Self-Encoding Array with Two Bead Types in Image Guide Wells

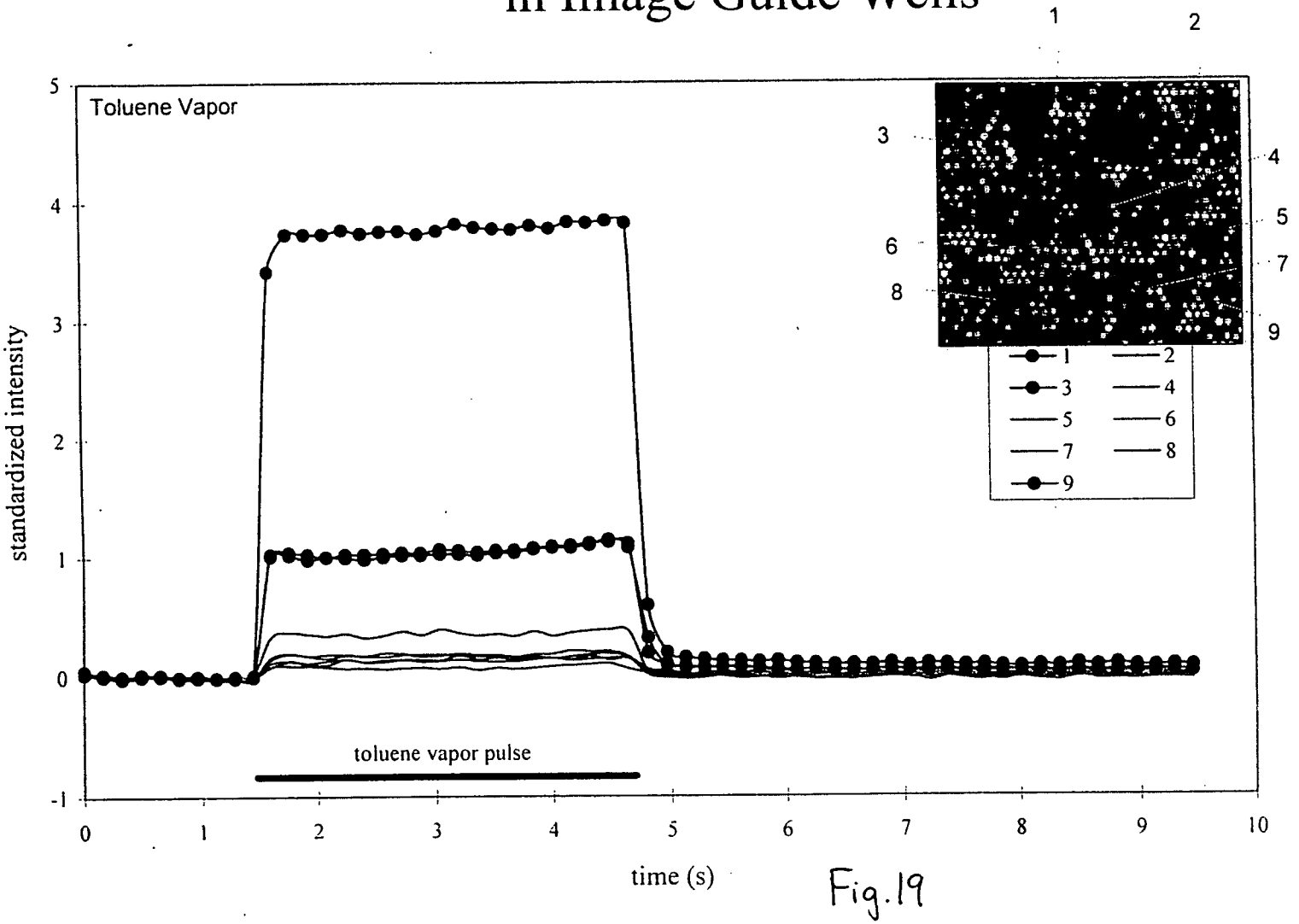
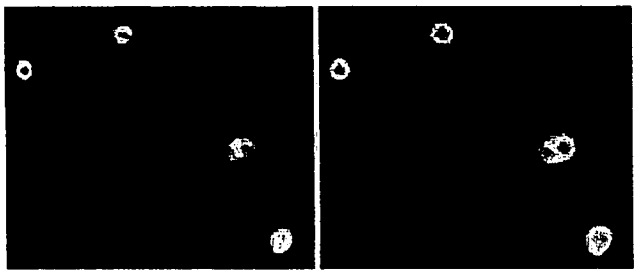


Fig. 19

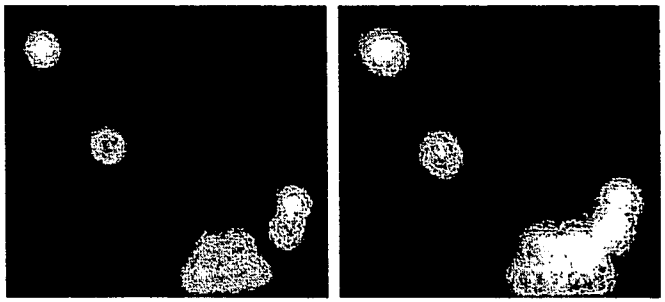
Swelling of three different bead types in presence of saturated toluene vapor

PS802 648.c



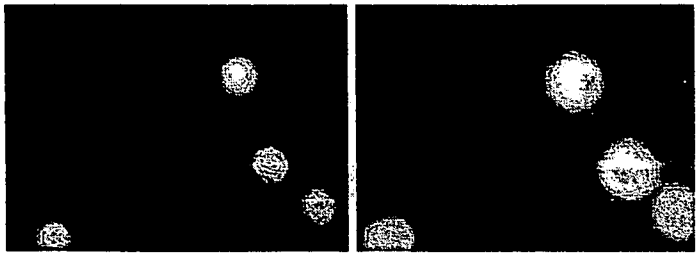
air toluene

Poly methyl styrene/
2% divinyl benzene



air toluene

Poly methyl styrene



air toluene

Fig. 20

Probe	[Cy5]	[Tamra]	[Eu-dye]	Correct Target Identification
HWt	1		0.1	93%
Bglo	0.5		0.05	88%
KWt	0.5		0.005	91%
IL6	0.1		0.1	96%
IL4	0.1		0.005	95%
IFNG		0.4	0.005	95%
IL2		0.04	0.05	98%

Fig 21

Fig 22

1) β-glo (segment of human β-globin)[26]
TCA ACT TCA TCC ACG TTC ACC
2) IFNG (interferon gamma 1)[26]
IFNG TGG GTT CTC TTG GCT GTT ACT
3) IL2 (interleukin-2)[26]
TA CAA GAA TCC CAA ACT CAC CAG
4) IL4 (interleukin-4)[26]
CC AAC TGC TTC CCC CTC TGT
5) IL6 (interleukin-6)[26]
GT TGG GTC AGG GGT GGT TAT T
6) K-ras WT[27]
GGA GCT GGT GGC GTA
7) H-ras WT[27]
CCG GCG GTG T
8) CFTR (cystic fibrosis exon 11)[13]
CAT TAT ACT TGT AGA G
9) R553X (cystic fibrosis exon 10)[13]
TGT AGA ATT ATC TTC
10) PAN132[19] (human peripheral lymphocyte)
CCT CTA TAC TTT AAC GTC AAG
11) Schena-2[16]
AAG TTT AAC CTA TAC CCT GTC
12) Hakala-1[20]
CCT ATG ATG AAT ATA G
13) Hakala-2[20]
AAT ATG ATA ATG GCC T

14) complement to probe 1
TG AAC GTG GAT GAA GTT G
15) complement to probe 2
AG TAA CAG CCA AGA GAA CCC AAA
16) complement to probe 3
CT GGT GAG TTT GGG ATT CTT GTA
17) complement to probe 4
AC AGA GGG GGA AGC AGT TGG
18) complement to probe 5
AA TAA CCA CCC CTG ACC CAA C
19) complement to probe 6
TAC GCC ACC AGC TCC
20) complement to probe 7
ACA CCG CCG G
21) complement to probe 8
CTC TAC AAG TAT AAT G
22) complement to probe 9
GAA GAT GTT AAA GTA TAG AGG
23) complement to probe 10
CTA GAC GTT AAA GTA TAG AGG
24) complement to probe 12
CTA TAT TCA TCA TAG G
25) complement to probe 13
AGG CCA TTA TCA TAT T

Fig 23

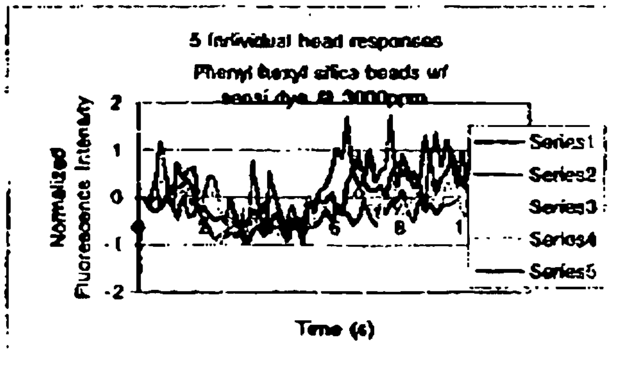
Target Identity	No. of beads in analysis section	[Cy 5]	[Tamra]	[Eu-dye]	Correct Target Identification
2	19		3	0.5	89%
4	15	0.01	0.1	0.1	87%
5	13		0.1	0.1	100%
9	5	0.01			100%
10	14			0.001	86%
11	12		0.1		92%
15	8	0.01	0.1		100%
16	24	0.1			92%
21	21	0.1	3		95%
24	16	0.3	3		94%

Table 4

Sequences	Number of microspheres	Mean background ± s.d.	Fluorescence after hybridization	Signal
Complementary target	10	997.01 ± 4.62	1036.94	39.93
	10	1003.46 ± 6.05	1035.83	32.37
	10	957.44 ± 5.59	985.25	27.81
	100	977.88 ± 3.21	1010.74	32.86
Poly A	10	1213.79 ± 6.33	1221.61	(7.81)
	10	1185.25 ± 9.39	1194.74	(9.49)
	10	1190.20 ± 4.85	1198.35	(8.15)
	100	1190.67 ± 4.05	1199.81	(9.14)
IL2	10	1090.58 ± 4.97	1096.11	(5.53)
	10	1120.62 ± 3.09	1113.88	(-6.74)
	10	1101.82 ± 5.51	1091.28	(-10.55)
	100	1104.36 ± 1.40	1103.06	(-1.30)

Fig 24

Fig 25



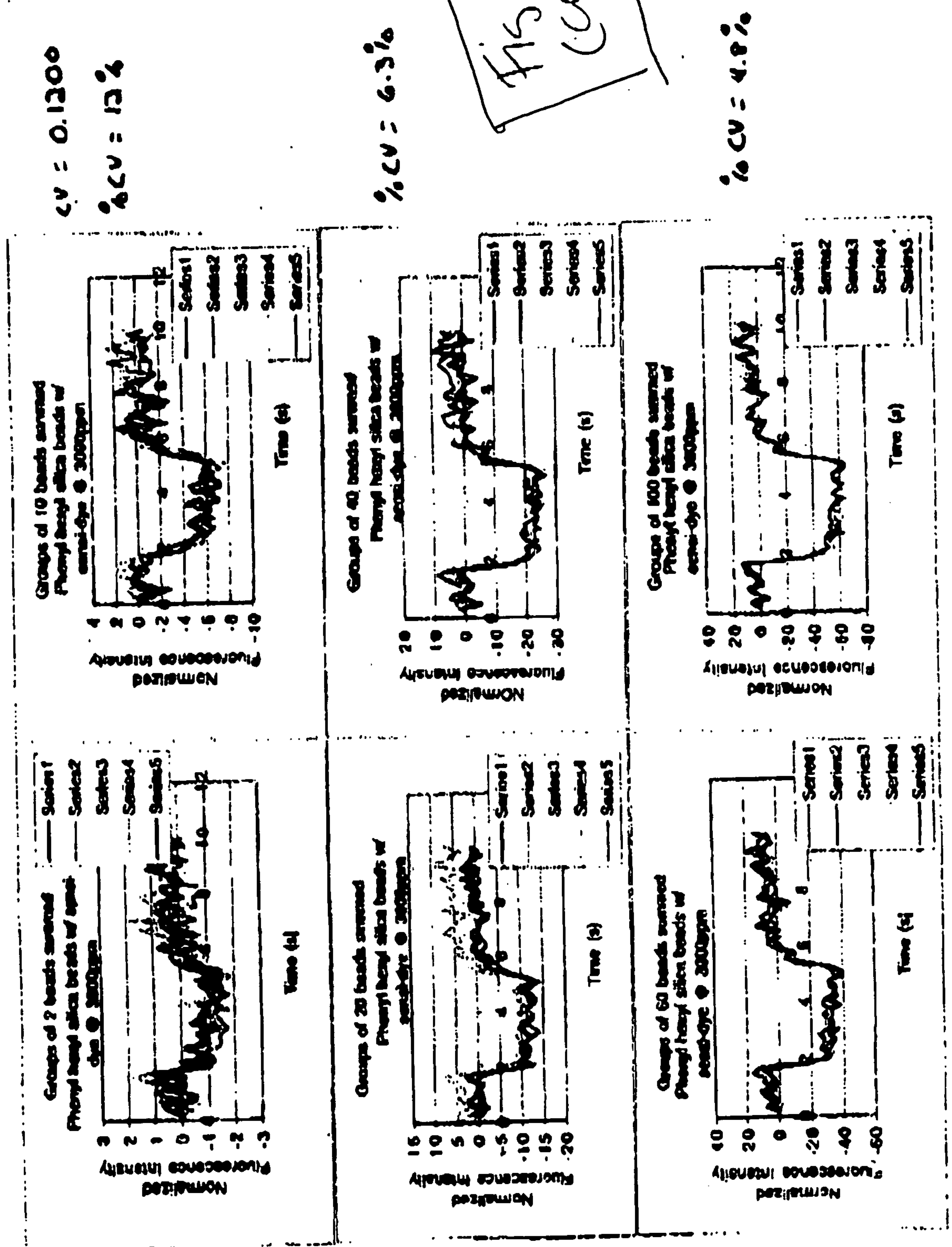
CV = 12.4%

CV = Coefficient of variance

$$CV = \frac{\text{st. deviation}}{\text{mean}}$$

Basic idea is that CV decreases as more bead responses are summed.

Fig 25 (Cont.)


CV = 0.1200
%CV = 13%
%CV = 6.3%
%CV = 4.8%
%CV = 5.5%
2.5%
7.6%
Time (s)
Normalized Fluorescence Intensity
Series1
Series2
Series3
Series4
Series5